OMNICOMM
Fleet management systems
Fuel consumption control

v 2.13

Omnicomm OPTIM terminal

Installation manual

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ABBREVIATIONS AND DEFINITIONS

GLONASS – Global Satellite Navigation System of the Russian Federation.

PC – personal computer.

SW – software.

VH – vehicle.

GPS (Global Positioning System) – Global Satellite Navigation System of the USA.

GSM (Groupe Spécial Mobile) – global digital standard for mobile cellular communication.

GPRS (General Package Radio Service) – GSM mobile communication add-on technology for package data transmission. GPRS allows the cellular network user to exchange data with other GSM network devices and external networks, including the Internet.

Home network – area within which it is possible to use the services of a given operator without using roaming services.

Roaming - procedure for providing cellular services to the subscriber outside the subscriber's home network coverage area by using the network resources of another mobile operator.

Communication server (CS) – server located in the territory of Omnicomm that collects and stores data from the vehicle onboard equipment and transmits data to Omnicomm SW.

Omnicomm Autocheck SW – server used to analytically process data received from the CS and the LCS and report on received and processed data.

iButton – set of devices for identification of drivers.

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1. INTRODUCTION

This installation manual describes the construction, principle of operation and operating procedures of Omnicomm Optim terminal.

2. DESCRIPTION AND OPERATION

2.1. MODIFICATIONS OF OMNICOMM TERMINALS

Omnicomm Profi and Omnicomm Optim terminals are equipped with unit compatible with GLONASS and GPS satellite systems.

Modifications of Omnicomm terminals differ by their design and the type of equipment to be connected. Modification-specific functions and technical specifications of Omnicomm terminals are described below.

2.2. PURPOSE OF OMNICOMM TERMINALS

Omnicomm terminals are designed to operate with Omnicomm monitoring system, as well as with the third party vehicle monitoring systems.

2.3. TECHNICAL SPECIFICATIONS

Specification	Value		Comments
	Omnicomm Profi	Omnicomm Optim	
General			
Overall dimensions, mm	127.5x100.5x38.0	101.0x90.0x31.5	W/o connected cable connectors and wires.
Ingress protection rating	IP51 (when cables are mounted into corrugation) / IP41 (when rubber cable glands are used)	IP20	
Operating temperature, °C	-40 to +60		
Front panel indication	LED		4 LEDs, see par. 3.3
Weight, kg	0.2		
Operating mode	continuous		
Power supply and power consumption			
Normal operation range, V	+10 to +48		Protection from reverse-polarity voltage.
Total operating range, V	+7 to +60		
Power consumption for different data collection modes, W, not more than – collect data during pounding; – collect data, except GPS; – collect all data.	 1.0 2.0 3.0		Excluding power supply of LLS sensors, internal heater operation and battery charge current.
Power consumption of the internal heater, W	3 to 11, when supply voltage is 10 to 32 V, respectively	-	The heater is activated when the temperature falls below -10°C.
Voltage of integrated power supply, V	12±0.5	-	Power supply of LLS sensors and external devices.
Load current of built-in power supply, mA, not more than	350	-	Built-in short circuit protection with self-restoring capacity.

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Built-in backup battery	Runtime not less than 8 hours in standby mode	-	Li type
Data collection			
Data collection period	15 to 3600 s		Set-up during installation
Archive capacity, records, not more than	150,000		Depending on number of collected parameters
Built-in peripherals			
Real-time clock	The time calculation error in standalone mode is not more than ±5 min. per year (when disconnected from GPS and GLONASS systems).		With stand-alone power supply. Automatic adjustment based on the GPS and GLONASS signals.
Accelerometer	Three-axis, measurement limit up to ±8 g.		
Temperature sensor	Absolute measurement error ±1°C.		
1Wire bus controller	+	-	For connection of iButton external reader.
Data transmission channel			
GSM/GPRS	850/900/1800/1900 MHz		
Interfaces			
RS-485 LLS	Data rate 19,200 bps		For connection of LLS 20160, LLS 20230 sensors.
RS-485 TS	Data rate 115,200 bps		For digital camera connection.
USB	2.0		For PC connection and setup
CAN	Contact or contactless connection to the vehicle electrical system.		
Voice communication			For connection of the external voice communication headset and speakers.
Discrete inputs			
Ignition key	Potential, actuation voltage not less than 8 V.		From ignition switch.
Alarm button	Actuated if the VH is shorted to ground, with internal uncontrolled tightening to power plus.		From alarm button.
Call answering input	Actuated if the VH is shorted to ground, with internal uncontrolled tightening to power plus		On the voice communication headset or as a separate button.
Pulse inputs			
Velocity	Frequency-modulated signal, input signal frequency 10 Hz to 100 kHz, signal amplitude not less than 5 V.	-	From pulse velocity sensor.
Engine speed	Frequency-modulated signal, input signal frequency 10 Hz to 5 kHz, signal amplitude not less than 5 V.		From generator, tachograph or pulse sensor.
Frequency fuel level sensor	Frequency-modulated signal, frequency 30 Hz to 1054 Hz, signal amplitude not less than 5 V.		From LLS-AF 20310 or similar sensors with a frequency-modulated signal.
Universal inputs			

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Number of universal inputs	4	2	Inputs are similar and not specially-purposed.
Connected signals	Analogue voltage signal, pulse signal, potential signal.		The signal type is programmable, connection is made via the same wire
Analogue signal:			
Input voltage range	0 to 30 V		
Measurement resolution	10 bits		
Basic percentage error limit	±1%		
Measurement rate	1 s		
Pulse signal:			
Pulse frequency	10 Hz to 10 kHz		
Minimum unit pulse duration	1 µs		
Input signal amplitude	not less than 5 V		
Potential signal:			
Actuation determination voltage limit	Programmable within the range from 1 to 30 V.		Actuation (logical unit recording) takes place during data collection if the input voltage exceeds the actuation threshold.
Minimum duration of existing voltage that exceeds the threshold for actuation recording	100 µs		
Discrete outputs			
Sound signal	Supply voltage to output switching, switching current up to 300 mA.		For connection of the sound source.
Freely controlled discrete output	Supply voltage to output switching, switching current up to 300 mA	-	Controlled by incoming SMS-messages
GLONASS + GPS global positioning system			
Systems in use	GLONASS and GPS together, 32 channels		
Positioning accuracy, m	up to 3		Depending on the number of visible satellites.
Cold start, s	not more than 60		Positioning period upon startup.
Hot start, s	not more than 15		Positioning period upon short shutdown.
Type of antenna	external, SMA connector		
Antenna mounting technique	to metal surfaces using the built-in magnet and additionally glued		To be only installed onto the VH roof or uncovered horizontal surfaces.

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2.4. SCOPE OF DELIVERY

No.	Description	Quantity, pcs
1	Omnicomm OPTIM terminal	1
2	GLONASS-GPS antenna	1
3	GSM antenna	1
4	Mounting parts set	1
5	Connecting cables set	1
6	Package	1
7	Data Sheet	1

Note:

The following is supplied optionally:

- alarm button*;
- CAN alligator clip;

* It is recommended to purchase these items from Omnicomm. For detailed description see Appendix B.

2.5. FUNCTIONS, CONSTRUCTION AND PRINCIPLE OF OPERATION

2.5.1. FUNCTIONS OF OMNICOMM OPTIM TERMINAL

Omnicomm Optim
1. Measurement of location (spatial coordinates), altitude and velocity of the VH.
2. Data collection from the VH at a preset interval, namely:
• data from 2 LLS 20160/ LLS 20230 fuel level sensors (fuel level, LLS sensors status, LLS sensors temperature) OR • data from 1 LLS-20310-AF fuel level sensor.
• data from 2 universal inputs;
• event registration time;
• ignition key status;
• engine speed values from pulse sensor or from CAN bus or based on the ignition key position;
• system voltage;
• Alarm button input status;
• acceleration values;
• data from CAN bus*.
3. Collection of additional location data during turns and slow turns.
4. Data transmission optimization when in home network or roaming.
5. Selection of the data collection and transmission mode when the ignition key is in off position: • Collect all data (with data transmission at intervals preset in the Omnicomm). • Collect all data, except GPS (with data transmission once an hour in home network and once a day in roaming). • Collect data during 5 minutes if accelerometer readings change by 0.2g, with subsequent transmission.
6. Data transmission when the alarm button is pressed.
7. Conversion of data (from engine speed sensor, pulse velocity sensor, pulse universal inputs) to physical values based on calibration and configuration factors.
8. Data reading and conversion to physical values of CAN bus data selected by the user during configuration.
9. Data storage in the internal non-volatile memory before data transmission to the CS.
10. Additional filtration of data from LLS sensors.
11. Recording and transmission of the following data to be displayed in Omnicomm Configurator SW, in addition to the parameters listed above: • Time values of the built-in clock.

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• Time values of the GPS/GLONASS system. • Internal temperature of the unit. • Voltage and number of pulses at pulse and universal inputs.
12. Processing of incoming and outgoing phone voice calls.
13. Adjustment of internal time based on the GPS data.
14. Two-color LED indication of unit statuses and Omnicomm power supply.
15. Processing of incoming SMS.
16. Parameter settings and firmware update via USB interface and via the CS based on the GPRS data.
17. Calculation of mileage based on the GPS data.

*** Data from CAN bus:**

- temperature of the engine coolant;
- pressure and temperature of the engine oil;
- accelerator pedal position [%];
- cruise control status;
- state and position of the foot brake (pedal);
- engine speed [rpm];
- fuel temperature;
- daily consumption [liter per 100 km];
- total consumption during the service life [l];
- weight load on the axis;
- instantaneous efficiency;
- state of the parking brake (handbrake);
- state and position of the clutch pedal;
- mileage [km] (daily/during the service life/before routine maintenance);
- engine runtime [h] (during the service life/hours before routine maintenance);
- axis index;
- instantaneous velocity [km/h];
- state of the doors (driver and passenger);
- state of the driver and front passenger seat belts.

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2.5.2 CONSTRUCTION OF OMNICOMM OPTIM TERMINAL

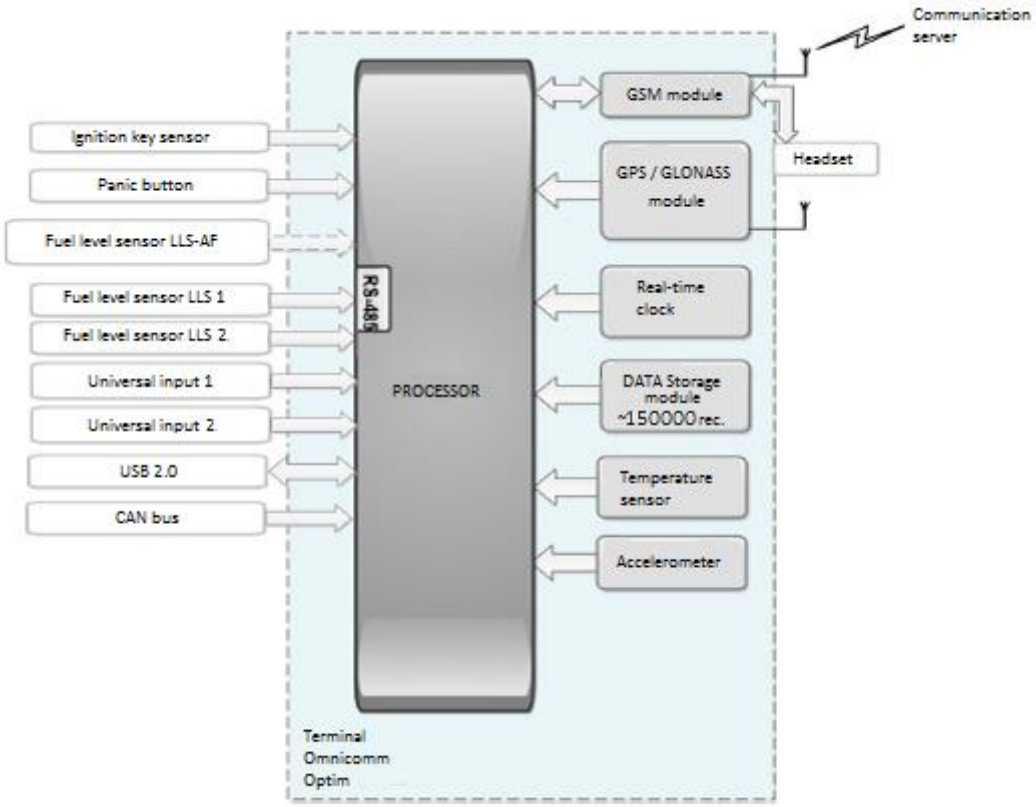

Figure 1 – Omnicomm Optim terminal flow chart

Microprocessor and Flash-Memory

The microprocessor ensures polling of modules and external devices connected to inputs and outputs of Omnicomm Optim terminal. The capacity of Flash-memory is 8 MB. If the data storage module memory is full the processor stops collecting data.

Inputs

Omnicomm Optim terminals have following inputs:

- Discrete inputs for the ignition key, alarm button and call answering button.
- Pulse inputs for the engine speed sensor and LLS-20310-AF frequency fuel level sensor.
- Two universal inputs for optional equipment.

The universal inputs Omnicomm OPTIM terminal is compatible with the following types of signals:

- Analog signal of DC voltage of up to 30 V
- Potential signal of DC voltage of up to 30 V;
- Frequency pulse signal with up to 1000 Hz frequency and up to 30 V amplitude.

Satellite navigation. There are two satellite navigation systems simultaneously used in Omnicomm OPTIM terminal: GPS and GLONASS systems. The satellite navigation system module collects the following VH data: location, course, speed, altitude, data validity, time in UTC (Coordinated Universal Time).

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RS-485 Interface

Omnicomm Optim terminals have one RS-485 interface for connection of two LLS 20160 or LLS 20230 sensors.

CAN interface. CAN interface allow reading data from CAN bus of the vehicle via FMS or J1939 protocol. The data reading can be either contact, by cutting into wires, or contactless, using CAN alligator clip.

GSM module. The GSM module ensures data transmission to the communication server via GPRS channel. Frequency range of the GSM module is of 850/900/1800/1900 MHz. Omnicomm Optim terminal is compatible with SIM-cards of Global mobile operators within frequency range of 850/900/1800/1900 MHz.

Voice communication set. Omnicomm OPTIM terminal has the interface for connection of the speaker and microphone from the voice communication headset.

Built-in accelerometer. Omnicomm OPTIM terminal has built-in accelerometer to measure acceleration along three coordinate axes and switch to Collect data during pounding mode.

Built-in RTC. The reading of the real-time clock is automatically synchronized with the time received from the global positioning system module, once every 15 minutes with the ignition key in ON position.

Configuration interface (USB). USB interface is designed for connection of Omnicomm OPTIM terminal to the PC.

Indication. Omnicomm OPTIM terminal has four two-color LEDs to indicate different events that take place during unit operation. The designation of LEDs is described in par. 2.5.4.

2.5.3 PRINCIPLE OF OPERATION

2.5.3.1 Data Collection at Preset Intervals and Data Collection on Turns

The microprocessor ensures polling of modules and external devices connected to inputs and outputs of Omnicomm OPTIM terminal at preset polling intervals.

The value of sensors and modules polling interval varies from 30 to 3,600 seconds and is set through Data collection timer (s) parameter in Omnicomm OPTIM terminal settings using Omnicomm Configurator SW (see Omnicomm Configurator User Manual).

The option of data collection on turns allows increase accuracy of turns displayed on the map through additional data collection from the GPS/GLONASS module at shorter intervals than those preset in Data collection timer parameter.

2.5.3.2 Operation upon Pressing the Alarm Button

When the alarm button is pressed Omnicomm OPTIM terminal:

- Immediately transmits data to the communication server;
- Sends an SMS to the number specified during configuration of the terminal using Omnicomm Configurator software.

2.5.3.3 Data Transmission to the Communication Server

If the VH is in the GSM home network, data is transmitted:

- When Period of data transmission to the CS (home network) preset during Omnicomm OPTIM terminal configuration has elapsed.
- When the alarm button is pressed.

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- If Omnicomm OPTIM terminal switches to Collect all data mode, except GPS mode once an hour.
- If Omnicomm OPTIM terminal switches to collect data during pounding mode. If during 5 minutes accelerometer readings changed again by more than 0.2g, data is transmitted every 5 minutes.
- On command of the SMS sent to the number of SIM-card inserted into Omnicomm OPTIM terminal.

If the VH is in roaming, data is transmitted:

- When period of data transmission to the CS (roaming) has elapsed or when the data volume preset in the Data package volume for transmission to the CS parameter has been achieved, preset during configuration of terminal.
- When the alarm button is pressed.
- If Omnicomm OPTIM terminal switches to collect all data, except GPS mode once a day.
- On command of the SMS sent to the number of SIM-card inserted into terminal.

2.5.3.4. Omnicomm OPTIM terminal Operating Modes

In **normal power supply mode** (the unit is powered by the onboard electrical system, VH battery or external optional battery) and **ignition key is ON position** Omnicomm OPTIM terminal switches to ***Collect all data*** mode**.** In this case terminal collects data selected during configuration of terminal using Omnicomm Configurator software. For data transmission connection to the communication server is made as preset according to par. 2.5.3.3.

In **normal power supply mode** (the unit is powered by the onboard electrical system, VH battery or external optional battery) and **ignition key is in OFF position** Omnicomm OPTIM terminal switches to any of the following three modes:

- ***Collect all data.*** In this case terminal collects data selected during configuration of terminal using Omnicomm Configurator software. For data transmission connection to the communication server is made as preset according to par. 2.5.3.3.
- ***Collect all data, except GPS.*** In this case terminal collects data selected during configuration of terminal using Omnicomm Configurator software, except data from the GPS module. For data package transmission connection to the communication server is made once an hour if the VH is in the home network or once a day if the VH is in roaming. If any module is de-energized the unit stops collecting their data.
- ***Collect data during pounding.*** In this case terminal controls the status of the alarm button, accelerometer. If accelerometer readings change by more than 0.2g, the alarm button is pressed; terminal is activated, collects all data selected during configuration and transmits data to the communication server. If during 5 minutes accelerometer readings changed again by more than 0.2g, terminal continues to collect and transmit data to the communication server every 5 minutes. If in 5 minutes accelerometer readings did not change by more than 0.2g and the VH velocity is less than 5 km/h, terminal switches back to control the status of the alarm button and accelerometer.

The data collection mode can be selected by setting Operating mode when the ignition key in OFF position and power is on parameter value during configuration of terminal using Omnicomm Configurator software.

Omnicomm OPTIM terminal not equipped with the built-in battery does not operate.

2.5.3.5. Omnicomm OPTIM terminal operation with LLS 20160/LLS 20230 and LLS-20310-AF Fuel Level Sensors

Omnicomm OPTIM terminal has option of additional filtration of LLS fuel level sensors which can be preset during configuration of terminal using Omnicomm Configurator software.

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When using LLS-20310-AF fuel level sensor, Omnicomm OPTIM terminal automatically brings frequency range of 30 to 1053 Hz preset during configuration of LLS-20310-AF fuel level sensor to the level measurement scale of 0 to 4095 points.

2.5.3.6. SMS

Omnicomm OPTIM terminal processes the following incoming SMS:

- Request to make connection to the CS (immediately upon receipt of this SMS).
- Request to send terminal current settings to the CS (immediately upon receipt of this SMS).
- Request for the following data from the VH (following this, the SMS is sent to the number from which the request was received): current status of the ignition key, current (or last known) velocity, last known location of the VH (without altitude), fuel volume in the tank, system voltage.
- Request for the status of terminal (following this, the SMS is sent to the number from which the request was received): terminal state, firmware version, number of archived records, time of recent data transmission to the CS, number of satellites, battery voltage.

For the description of command formats see Appendix B.

2.5.3.7. Configuration of Omnicomm Optim terminal

Omnicomm Optim terminal can be configured using Omnicomm Configurator software. Omnicomm Optim terminal can be connected to the PC via USB interface using USB-mini USB cable.

To configure Omnicomm Optim terminal connect USB cable and the mains power cable.

Attention! Before connecting Omnicomm Optim terminal to a Notebook via USB interface it is recommended to disconnect PC from the mains and power it from the Notebook battery.

If it is impossible to disconnect PC from the mains strictly observe the following procedure for connection of Omnicomm Optim terminal:

1) Connect USB cable to Omnicomm terminal and PC.

2) Connect Side 1 power connector to Omnicomm terminal.

Important: Before connecting USB interface you shall disconnect Side 1 from Omnicomm terminal. It is not enough to simply de-energize terminal.

During configuration of Omnicomm terminal, already installed on the VH ground, the VH body and the PC housing shall be grounded, if the PC is not powered by the PC battery.

During configuration of Omnicomm terminal on the VH, do not disconnect the mass break switch on the VH when you connect USB interface.

Failure to observe these requirements can cause damage to USB interface of the PC.

2.5.3.8. Firmware Updates

The microprocessor firmware is updated via wired USB interface using Omnicomm Configurator software (see Omnicomm Configurator User Manual) during unit connection to the PC.

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2.5.4. OMNICOMM OPTIM TERMINAL LEDS

Table 3

LED	Indication mode	Value
Power supply, red/green	Off	Power is off
	Flashing, red-green	Power: normal or from USB Ignition: OFF Operating mode: Collect data during pounding
	Always on, green	Power: normal Ignition: ON or Power: normal Ignition: OFF Operating mode: Collect data, except GPS or Collect all data
	Always on, red	Ignition: OFF Operating mode: Collect data during pounding
GPS, red/green	Off	In case of module failure Emergency LED lights up
	Always on, green	Valid data is received from satellites
	Always on, red	Data is not received from satellites or invalid data is being received
GSM, red/green The number of LED flashings depends on number of red LED actuations, following green LED actuation	Off	Power: normal Ignition: OFF Operating mode: Collect data during pounding In case of module failure Emergency LED goes on
	Always on, red	Outside the GSM network coverage
	Always on, green	Within the GSM network coverage; however, without data exchange with the communication sever via GPRS channel
	Flashing 1 time (following green LED actuation, red LED lights up 1 time)	SIM-card error or the card is not inserted. Insert or replace the SIM-card
	Flashing 2 times (following green LED actuation, red LED lights up 2 times)	The card is blocked (with the PIN code). Unblock the card, disable the PIN code request upon card activation
	Flashing 4 times (following green LED actuation, red LED lights up 4 times)	Within the GSM network coverage, with data exchange with the communication server via the GPRS channel, connection
Emergency, red/green The number of LED flashings depends on the number of red LED actuations, following green LED actuation	Off	The unit operates properly (fault-free)
	Always on, red	The internal elements of the unit or global positioning system module or GSM module are out of order

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		(broken). Contact the supplier
	Flashing 1 time (following green LED actuation, red LED lights up 1 time)	Configuration failure. Update configuration using Omnicomm Configurator software
	Flashing 2 times (following green LED actuation, red LED lights up 2 times)	Archive storage failure. Archived data will be lost. Contact Omnicomm technical support center
	Flashing 3 times (following green LED actuation, red LED lights up 3 times)	Failure of data exchange with one or more LLS sensors. Check configuration of the LLS sensors, communication line, LLS supply voltage as per LLS 20160, LLS 20230 Installation manual
* Note: In case of internal failure (Emergency LED lights up) the satellite navigation system module and GSM module serviceability is indicated by their LEDs. If the LEDS are off and not flashing when the ignition key is in ON position the relevant module is out of order.		

2.5.5. PARAMETERS DETERMINIG THE TRAFFIC VOLUME

The values of the following parameters set during configuration of Omnicomm Optim terminal using Omnicomm Configurator software determine the traffic volume:

1) The number of data collection parameters selected during configuration of terminal. Only data enabled for data collection is transmitted by terminal.

The maximum data package volume is 200 kB.

2) Data collection timer (s) – the period of time after which all sensors connected to Omnicomm terminal and the satellite navigation system module are polled again. When the value of the data collection timer is increased the traffic volume is decreased, leading to a less accurate representation of the route on the map. However, the calculated vehicle motion values are accurate. The recommended value is 30 sec.

3) Enabled adaptive data collection on turns increases the number of recorded events and, thus, increases the traffic volume. Period of data transmission to the CS (min) - the time after which terminal shall establish connection to the communication server.

The recommended value for the VHs in the home network is 10 minutes.

The recommended value for the VHs in roaming is 180 minutes.

Data package volume for transmission to the CS (kB) - the data package volume at which terminal shall establish connection to the communication server while being in roaming.

The recommended value is 100 kB.

4) The operating mode of the terminal with the ignition key in OFF position and normal power supply: Collect all data, Collect all data, except GPS or Collect data during pounding.

2.5.6. PRINCIPLE OF OPERATION OF THE UNIVERSAL INPUTS OF OMNICOMM TERMINAL

One of the following types of sensors can be connected to universal input:

- analog sensor with output voltage or output current signal;
- pulse sensor with output frequency signal;

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- potential sensor.

Analog voltage output signal – signal where the measured value of the sensor is proportional to the sensor output voltage. The higher voltage the higher measured value (directly proportional signal) or the lower voltage the higher measured value (inversely proportional signal). Omnicomm terminal can operate with both directly proportional and inversely proportional signals.

Sensors that have the output current signal (the most common is 4...20 mA and 0...20 mA signal) instead of the output voltage signal can also be referred to analog sensors. To connect these sensors to Omnicomm terminal install **the shunt resistor** and measure voltage drop across terminal (i.e. the current signal is converted to the voltage signal that can be sensed by Omnicomm Terminal).

The analog voltage signal measured by Omnicomm terminal is converted to the physical value measured by sensor. The conversion is performed linearly based on two points assigned during configuration of Omnicomm terminal.

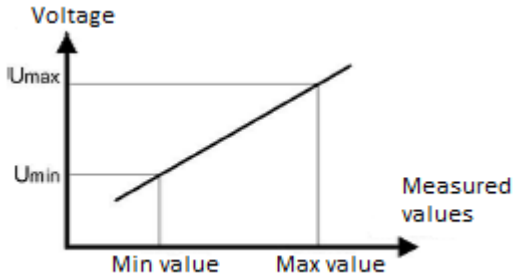

Figure 2 – Assignment of the law for voltage conversion in the measured physical value

The measured value averaged over the data collection period and obtained upon linear conversion is transmitted to Omnicomm Autocheck SW.

Pulse (or frequency) signal – signal where the measured value is frequency-modulated. I.e. the higher the measured value the higher number of pulses per unit time. For pulse signals Omnicomm terminal summarizes the number of pulses (at the leading edge, i.e. at the signal increase edge) over the data collection period, multiplies the sum by the factor of pulse input calibration and transmits the result to Omnicomm Autocheck SW. The sum is multiplied by the calibration factor for the purpose of conversion of number of pulses in physical value measured by the sensor (for example, the number of pulses can be converted in the engine speed).

The pulse signal is also used to count the number of events that take place more often than the data collection period. For example, you can count the number of passengers entering a public vehicle through the doors. In this case Omnicomm terminal summarizes the number of door sensor tripping and transmits the number of passengers entered (or exited) over each data collection interval to Omnicomm Autocheck SW. In this case set the calibration factor to 1, since one sensor tripping corresponds to one passenger.

Potential signal – signal indicating the occurrence of any event that takes place less often than the data collection period. The fact that the event occurred shall be recorded, however, the exact time of its occurrence is not important (it is enough to determine the time within the data collection period). Such events can include triggering of any equipment, lowering of actuators of the VH, doors opening etc. The value from the sensor with potential signal is logical: ON (logical unit) or OFF (logical zero). However, this state can exist for the period longer than the data collection period.

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ON (logical unit) is recorded by Omnicomm terminal if the input of terminal receives the voltage signal that exceeds the actuation voltage threshold and lasts for more than 0.5 s. Potential input ON (logical unit) is transmitted to Omnicomm Autocheck SW as 1000, logical zero – as 0. This is graphically shown in the figure below (Figure4).

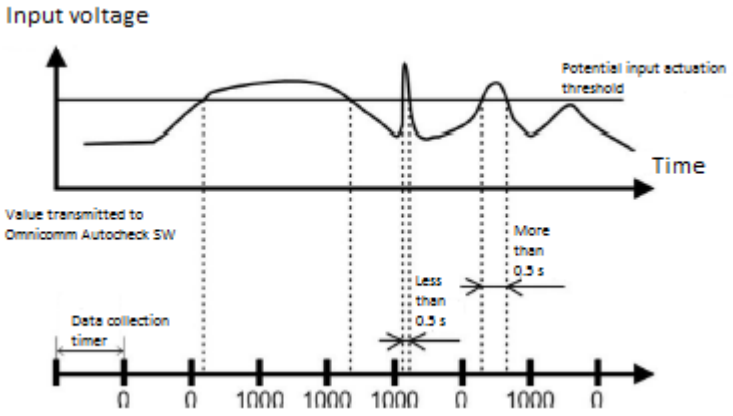
Input voltage
Potential input actuation threshold
Time
Value transmitted to Omnicomm Autocheck SW
More than 0.5 s
Less than 0.5 s
Data collection timer
0 0 1000 1000 1000 0 1000 0

Figure 4 – Operation of the potential input of Omnicomm terminal

If necessary, you can invert the voltage signal before its transmission to Omnicomm Autocheck SW, i.e. ON signal (logical unit) is converted to OFF signal (logical zero) and vice versa.

Which type of signal shall be configured – pulse or potential? How to select the type?

Configure the pulse signal if you want to count the number of events or triggers, and the potential signal if you want to record the event occurrence, determine the current state of the monitored object and calculate the duration of a certain state of the object.

Example: Assume we have a door sensor. To count how often the door was opened during for any period configure the input of Omnicomm terminal as the pulse input. In this case every opening event cause that a non-zero value appears in the data package transmitted to Omnicomm Autocheck SW during the relevant data collection period. However, it will be impossible to determine the period of time during which the door was opened, as well as its current state. To control the period of time when the door is opened and its current state configure the input as the potential input. This is graphically shown in the figure below (Figure 5).

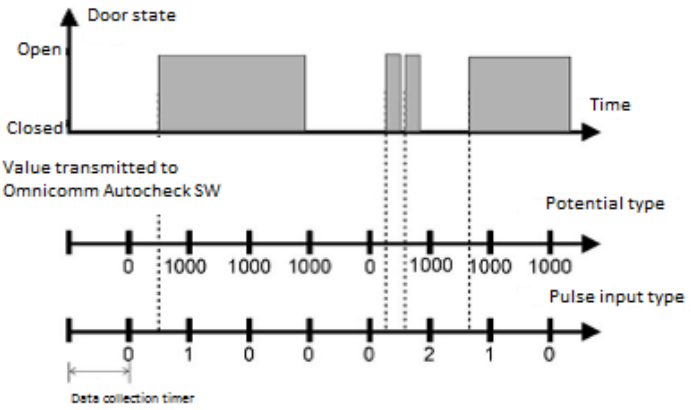

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Figure 5 – Different output values of pulse and potential types of inputs during processing of the door sensor signal

2.6. MARKING

The unit housing is marked as follows:

- serial number of the unit;
- trademark or logo of the manufacturer;
- supply voltage;
- product designation;
- ingress protection rating;
- operating temperature range;

2.7. PACKAGING

The unit is packaged with the supplied items in an individual consumer container.

3. INTENDED USE

3.1. OPERATING LIMITS

The unit is designed for continuous operation in climatic conditions of enclosed VH cabin.

Avoid unit contact with water or other liquids. Protection rating of Omnicomm Optim terminal – IP20.

During welding works performed on the VHs equipped with Omnicomm terminals and connected to LLS 20230 fuel level sensors, along with BIS 20240 spark protection units, in order to prevent failure of the terminal, you MUST disconnect cables from SIDE1 and SIDE2 connectors of the terminal and battery terminals.

During welding works performed on the VHs equipped with Omnicomm terminal and connected to LLS 20160 fuel level sensors in order to prevent failure of the terminal:

- disconnect cables from SIDE1 and SIDE2 connectors of terminal and battery terminals (preferred option)

or

- connect the second electrode of the welding machine in close vicinity to the welding site and disconnect battery terminals.

3.2. PREPARATION FOR USE

Prepare and connect Omnicomm Optim terminal to the following devices as described in Omnicomm Installation Instructions:

- optional equipment;
- engine speed sensor;
- ignition key terminal;
- LLS fuel level sensors or one LLS-AF sensor;

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- alarm button;
- voice communication set;
- external battery.

Configure the unit using Omnicomm Configurator software (see Omnicomm Configurator User Manual).

To use voice calls enable the voice calls service on SIM-card inserted into terminal.

To use short messages in SMS-messages enable the short message service on SIM-card inserted into terminal.

If the VH is operated outside country connect service of international roaming.

When using LLS-20310-AF fuel level sensor configure the output signal as the frequency signal and set the maximum and minimum frequency values – 1053 and 30 Hz, respectively.

3.3. TYPES OF OPTIONAL EQUIPMENT THAT CAN BE CONNECTED TO OMNICOMM

Depending on the type of optional equipment Omnicomm Optim terminal can display data shown in the table below (Table 4).

Table 4

Measured value	Sensors/types of sensors	Signal type
Fuel, reactants, fertilizers consumption etc.	Flow meters with pulse output	**Pulse** (frequency-modulated signal the frequency of which is proportional to the measured or recorded value)
Control of an auxiliary engine speed or any other equipment driven by the power take-off	Proximity sensor that determines the shaft (gear, drive etc.) speed	
Fuel level in the optional fuel tank or hydraulic liquid tank	Sensor of physical values, LLS-20310-AF fuel level sensor in frequency output mode	
Number of events that occur more often than the collection period: excavator bucket lifting/lowering, number of public transport passengers, conveyor loading /unloading etc.	Contact switches, proximity sensors triggered by each event	
Fuel level in the auxiliary fuel tank or hydraulic liquid tank	Sensor of physical values, LLS-20310-AF fuel level sensor in frequency output mode	**Analog** (voltage or current signal, signal of which is proportional or inversely proportional to measured value)
Temperature, pressure, humidity etc.	Temperature, pressure, humidity etc. sensors or analog transmitters with output voltage or current signal	
Optional equipment on/off (engine, burner, attachments)	Proximity sensors, sensors of physical values (e.g. pressure) or other signal sources	**Potential** (signal of triggering of any device followed by supply of the specific voltage (potential) across any wire)
Number of events that occur less often than the data collection period: taxi passenger boarding, dump truck body lifting, plough lowering etc.	Contact switches, proximity sensors	

Omnicomm Optim terminal has two universal inputs for optional equipment.

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3.4. USE OF THE UNIT

The unit is operated by two users: **Driver** and **Operator**.

3.4.1. DRIVER USER

- The Driver drives the VH and performs works listed in the job description.

Using the alarm button

- If necessary, it is used to inform the user of Omnicomm Autocheck SW of an emergency the Driver shall press the alarm button.

Using the voice communication set by the Driver

- If necessary, it is used to make outgoing calls via the headset connected to terminal to the number preset during configuration of terminal. An outgoing call is made upon pressing the button located on the headset connected to terminal.
- Receipt of operator incoming calls. An incoming call is received either automatically or upon pressing the button located on the headset connected to terminal.

3.4.2. FUNCTIONS PERFORMED BY THE USER

Data processing using OMNICOMM AUTOCHECK SW

- Processes the data received from Omnicomm Optim terminal using Omnicomm Autocheck software.

Making calls and receipt of driver voice calls

- Makes outgoing voice calls to the Driver through the headset connected to Omnicomm Optim terminal;
- Receives voice calls from the Driver.

Acquisition of Omnicomm Optim terminal

- Sends the command for transmission of the following VH data as an SMS: current (or last known) ignition status, current (or last known) speed, the last known coordinates of the vehicle (no height) amount of fuel in the tank, the system voltage.
- Sends the command for transmission of terminal state as an SMS: firmware version, number of archived records, time of recent data transmission to the CS, number of satellites, battery voltage.

For the description of command formats sent by the operator in the SMS see Appendix B.

4. MAINTENANCE

The maintenance consists in visual inspection of connecting cables integrity, connectors reliability, antennas reliability, seals and fuses integrity.

It is recommended to perform maintenance works at least once a year.

Replace integrated power sources every 6 years;

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5. ROUTINE REPAIR

For replacement or repair send Omnicomm Optim terminal to the manufacturer's service center. In case the Omnicomm Optim terminal is repaired by non-authorized personnel the warranty will be cancelled.

6. MANUFACTURER'S WARRANTY

24 months from the date of original purchase from OMNICOMM (if the other period or conditions did not arranged by special agreements with certain vendor/supplier, or covers the certain territory) providing the user follows transportation, storage, installation and operation rules described in the operating instructions.

The warranty period does not cover built-in power sources, including rechargeable ones (batteries). Replace built-in power sources as often as it is required by the relevant operation manual. For replacement send the unit to the manufacturer's service center.

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REVISION HISTORY

Date	Version	Description
29.04.13	1.13	Initial Release
19.08.13	2.13	Update Optim inputs
11.09.13	3.13	Changed logo

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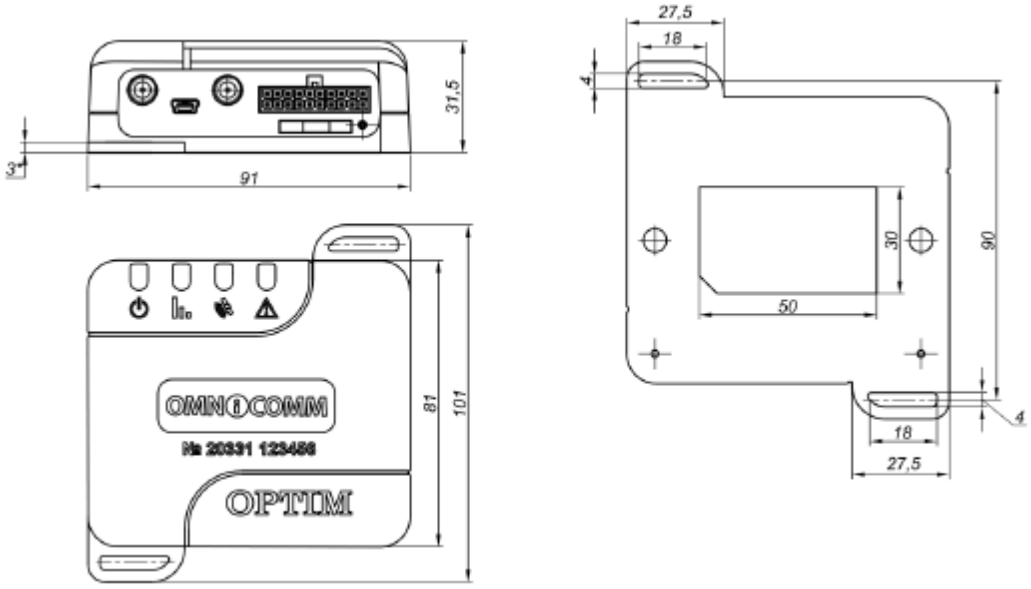
APPENDIX A

Dimensions of Omnicomm Optim terminal



***All dimensions in millimeters (mm)**

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APPENDIX B

List and Format of Commands Sent by the Operator in SMS

Command		Purpose
SMS command text	**SMS command reply**	
*SOUND 1#	SOUND ON	Request to turn the siren on
*SOUND 0#	SOUND OFF	Request to turn the siren off
*SETDOUT param# Param=0 Param=1 Param=0,1	**SETDOUT param** Possible parameter values: **param** = OK if the command was sent for execution **param** = ER if the command wasn't sent for execution	Request to enable the discrete output
*CLRDOUT param# Param=0 Param=1 Param=0,1	**CRLDOUT param** Possible parameter values: **param** = OK if the command was sent for execution **param** = ER if the command wasn't sent for execution	Request to disable the discrete output
*GETDOUT#	**DOUT 0=1 1=0** where: output_number=output_status	Request for the discrete output status
*CONNECT#	**CONNECT CS_address:port**	Request to connect terminal to the CS
*GETLINK#	**LINK ip4_CS_address:port date_and_time**	Request for CS connection status
*GETINFO#	**INFO DID**=deviceID **VID**=VehicleID **HW**=hardware_code_version **BL**=boot_loader_version **FW**=firmware_version **REC**=number_of_archived_records	Request for terminal status
*GETSTAT#	**STAT**=terminal_date_and_time **GPS**=GPS_position **SPD**=speed **IGN**=ignition_status **L1**=fuel_level:sensor_status… **L6**=fuel_level:sensor_status	Request for VH status
*RESET#	**RESET param** Possible parameter values: **param** = OK if the command was sent for execution **param** = ER if the command wasn't sent for execution	terminal reset

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